Journal of Precision Teaching

Proceedings
A Celebration Celebration: Achievement for All

11th Annual International Precision Teaching Conference
Salt Lake City, Utah
March 24 - 27, 1993
The *Journal of Precision Teaching* (ISSN 0271-8200) is a multidisciplinary journal that is dedicated to a science of human behavior which includes direct, continuous and standard measurement. This measurement includes a standard unit of behavior, *frequency*; a standard scale on which successive frequencies are displayed, the *Standard Celeration Chart*; a standard measure of behavior change between two frequencies, *frequency multiplier*, and a standard, straight-line measure of behavior change across seven or more frequencies, *celeration*. Frequencies, frequency multipliers, and celerations displayed on the Standard Celeration Chart form the basis for Chart-based decision-making and for evaluating the effects of independent variables.

The purpose of the *Journal of Precision Teaching* is to accelerate the sharing of scientific and practical information among its readers. To this end, both formal manuscripts and informal, Chart-sharing articles are to be considered for publication. Materials submitted for publication should meet the following criteria:

* be written in plain English
* contain a narrative that is brief, to the point, and easy to read
* use the *Journal of Precision Teaching* Standard Glossary and Charting Conventions (See Volume X, Number 2, Spring, 1993, pp. 79 - 82.)
* format references according to the *Publication Manual of the American Psychological Association*
* contain data displayed or displayable on the Standard Celeration Chart to justify conclusions made
* direct data points may be submitted, so the Charting Macro program (Slocum, 1990) may produce an electronic version of the Chart
* original charts may also be submitted.

Articles which are not data-based and do not include data displayed on Standard Celeration Charts may be included. These articles should substantially contribute to the development or dissemination of Precision Teaching/Learning. “About PT” is a column for shorter notes.

The *Journal of Precision Teaching* staff:
Claudia E. McDade, Editor
John M. Brown, Assistant Editor
Ann L. Poe, Managing Editor

**Board of Consulting Editors:**

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**Editor Emeritus**
Ogden R. Lindsley

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Editor’s Comments

Claudia E. McDade

This issue of the *Journal of Precision Teaching* celebrates the 11th Annual International Precision Teaching Conference, held in Salt Lake City, UT March 24-27, 1993. If you could not attend, perhaps this issue will give you a feeling of the meeting, of the diversity of uses of Precision Teaching, of the further training opportunities available for Precision Teachers, of the mentoring relationships Precision Teachers develop for each other. Perhaps this issue will encourage you to be in on the next exciting International Precision Teaching Conference!

In addition to the introductory Precision Teaching workshop with trainers Ray Beck, Denise Conrad, and Peggy Gaylor from the Great Falls Teaching Project, advanced sessions were provided in megacharting by Ogden Lindsley, Abigail Calkin, and Owen White; in using PT to accelerate PT fluency by Elizabeth Haughton, Gina Freeman, and Steve Graf; and in advanced uses of the Chart by the team of Richard West and Richard Young. Michael Maloney gave his famous workshop on teaching Charting to children, with invigorating Direct Instruction scripts. Kent Johnson’s workshop on building fluency in reading, math, and writing provided specific suggestions for teachers and learners, as well as an introduction to the Morningside Model of Generative Instruction. Participants in Steve Graf’s workshop on Graphics PracticeSheeter™ took home the software and the skill to develop pixel-based practice sheets.

Some of the individual sessions are highlighted in this issue of the *Journal*. For many years we have been asking what are the specific tool skills necessary to develop particular component skills and what fluency ranges will predict fluid performance of the component skills. The Haughton Learning Center Precision Teachers have provided some of their experience with ranges here in reading and handwriting fluencies, while Annie Dejardins and Tim Slocum have listed the specific learning channel practices required for fluency development in reading, spelling, and mathematics they are using at the Cache Valley Learning Center.
Other presentation summaries published here describe many uses of Precision Teaching in multiple settings with all kinds of learners. While several articles relate to elementary or secondary students, some also deal with skills development in college students. Precision Management articles address concerns of administrators, stimulating uses of the Standard Celeration Chart for projecting trends and strategic planning. Alternate uses of Precision Teaching abound in articles describing attitudinal research, the measurement of virtual reality technology, and the modification of inner behaviors. Feel free to contact the authors for sample materials and charted data!

This issue of the *Journal* also contains an editorial by Assistant Editor, John M. Brown which epitomizes the differences between traditional education and Precision Teaching, as well as indicates his evangelical zeal for Precision. A column for letters to the editor is also included here to provide opportunity to critique articles in the *Journal*, to request modifications to its guidelines, to ask for support for ideas, or to share celeration celebrations. Feel free to write to the editor!

Lastly, an apology for an error in Volume X, Number 1 (Fall, 1992) is necessary. Consulting Editor Malcolm D. Neely's name was misspelled—not once, but twice. In his good-natured, positive Precision Teaching manner, Malcolm razed me a bit about the mistake by sending a Direct Instruction procedure to teach me the correct spelling of M-A-L-C-O-L-M. With the positive and negative instances he designed, I can guarantee that I will never misspell Malcolm again. Just to be certain, my spell-checker won't let me.

Pleasant Charting!
Letters to the Editor

Dear Claudia:

...A couple of observations about Cindy (Street) and my article come to mind. One is that while reading the article from the Journal, I remembered initially writing in the learning channels (e.g., see/say). I removed them because I felt they made readability more difficult. I still think so; but I also think learning channels should be advanced. Perhaps they should be introduced, once, then notated thereafter; or sub-headed; or be placed in the margins...

And a concern, the concern has to do with Daly and Guldswog's Table 2 on p. 39. The frequency differences are stated as add and subtract. We do not allow add/subtract charts in the Journal. So, too, we should help our authors to think/write in the multiply/divide world. The frequency differences in Table 2 should have been stated as multiply and divide differences (Refer to one of Og's writings and deliveries re MUSIC)...

Yours in Charting,

Malcolm D. Neely
18 January 1993

Dear Dr. McDade:

We would like to have the enclosed "Call for Papers" appear in a spring issue of the Journal of Precision Teaching. Please let me know if you need additional materials.

Sincerely, Nancy Duncan, Co-Chair, Program Committee
Society for Computers in Psychology

Society for Computers In Psychology
Call for Papers
23rd Annual Meeting of the Society for Computers in Psychology
Washington, D. C.
November 4, 1993

The 23rd annual meeting of the Society for Computers in Psychology will be held in Washington, D. C., on November 4, 1993, the day before the annual meeting of the Psychonomic Society. The meeting includes presentation, workshops, tutorials and demonstrations. The application of computer-based solutions to all areas of psychology are featured, including research, education, clinical practice, and industrial applications. The DEADLINE for submission is June 25, 1993. For more information about the meeting or becoming a member of the Society, contact Nancy Duncan, Department of Psychology, Hampton University, Hampton, VA 23668 <71043,4310@compuserv.com> OR Ellen Rosen, Department of Psychology, College of William and Mary, Williamsburg, VA 23187 <Internet:EFROSE.MAIL.WM.EDU>
CALL FOR MANUSCRIPTS

The *Journal of Precision Teaching* was founded to provide a mechanism of communication among Precision Practitioners--teachers, administrators, rehabilitation specialists, special educators, etc. Every person reading the *Journal* also has something to contribute to it. Send us your “Charticles”—formal reports with Standard Celeration Charts, “Chart Shares,” “Data Wanted” ads for “Notes from Below the Floor,” “Successful Curriculum Materials,” or less formal experiences with Precision Teaching. Each will be considered for inclusion in the *Journal* and forwarded for review.

“Successful Curriculum Materials” is an idea contributed by Elizabeth Haughton and discussed at the editorial board meeting of the *Journal* at the 10th International Precision Teaching Conference. Send us any practice sheets or SAFMEDS lists that have produced strong results with students—preferably with a Standard Chart presenting the data. These will assist the *Journal* in becoming more attractive to teachers who can model effective curriculum materials in their own settings.

Review in the *Journal of Precision Teaching* is open with both the reviewers and the authors knowing the others’ identities. Twelve people serve as consulting editors to the *Journal of Precision Teaching* for one to three year terms. They are listed in the inside front cover of every issue. Many others have offered to serve as guest reviewers. All Precision Teachers are encouraged to become guest reviewers by writing the *Journal of Precision Teaching*, Center for Individualized Instruction, Jacksonville State University, Jacksonville, AL 36265. To serve as either a guest reviewer or consulting editor, a Precision Teacher must have submitted an article for review in the past twelve months!

Remember: without manuscripts, the Journal will cease to exist!!
Chart Share Guidelines

Precision Teachers wishing to share interesting Charts without writing lengthy articles are encouraged to submit a Standard Celeration Chart-share. Each Chart-share is limited to two pages in length—one Chart and a maximum of one page of explanatory text. The Chart and accompanying text will be printed on reverse sides of the same page to ensure they will not be separated if removed from the Journal for copying.

The Chart: The Chart should be as self-explanatory as possible. All the information at the bottom of the Chart (i.e., Supervisor, Adviser, Manager, etc.) should be completed as descriptively as possible. All charting conventions should be followed. If additional symbols or extensions of the conventions are required, they should be explained in an appropriate “Key.” For example, if in addition to charting “words said correctly” with a • and “words said incorrectly” with an x, you wish to note “words omitted” with a Δ, that should be noted on the Chart. Each phase of a multi-phase project should be clearly labeled with brief but descriptive phrases. For example, instead of labeling phases, “Phase I, Phase II,” etc., the phases might be labeled, “One minute of practice; teacher charts results,” and “Same practice; learner charts results.” Additional notes should be provided as necessary to explain the project, unplanned events which appeared to affect performances, and other features of interest.

The Back: The back of the Chart may be used to explain the project in more detail. At a minimum, try to provide the following:

1. title for the project;
2. your name and affiliation;
3. names and affiliations of other people involved in the project (first names, initials, or pseudonyms may be used to protect privacy, if necessary);
4. the purpose or goal of the project;
5. the specific measurement cycle(s) or target(s) being evaluated;
6. a brief statement of what you learned from the project.

Space permitting, you may add as much additional comment or discussion as you wish. If the submission exceeds the space available, the Journal editors will make whatever changes are necessary while trying to preserve the basic message of the Chart-share.

-- Owen R. White, Consulting Editor
Association for Precision Teaching
...a division of the Standard Celeration Society

Association for Precision Teaching

A network and support group for Precision Teachers and Precision Learners—those who use the Standard Celeration Chart in education, training, and self-directed learning.

Standard Celeration Society

A professional organization for all those who use the Standard Celeration Chart in education, therapy, economic analysis, marketing, financial planning, quality improvement, performance management or science.

Why Join?

The association for Precision Teaching provides a “home” for charting and Precision Teachers. It is a network of colleagues and friends devoted to improving teaching and learning. A variety of benefits to members include:

* a year’s subscription to the Journal of Precision Teaching
* reduced conference fees for the International Precision Teaching Conference
* periodic mailings and notices about developments in Precision Teaching

History

The Association evolved from a 25-year history, beginning with the founding of Precision Teaching by Dr. Ogden Lindsley, supported by the Precision Teaching Project in Great Falls, Montana, and maintained with ten international Precision Teaching Conferences. In 1990, PT leaders from around North America decided it was time for an organization with expanded scope—to serve a broader range of needs for communication and networking among Precision Teachers and to make PT methods available to those seeking measurably effective educational alternatives. The APT, as part of the Standard Celeration Society, will address those needs with more than a conference, including the Journal, a membership directory, and opportunities to serve on committees and special projects.
Association for Precision Teaching  
...a division of the Standard Celeration Society

Membership Application/Renewal for 1993--1994

Name: ____________________________________________________________

Title: ____________________________ Organization: ______________________

Street: ___________________________________________________________

City: ____________________________ State/Province: ______________________

Zip/Mail Code: ________________ Country: ______________________________

Home Phone: (___) __________________ Work Phone: (___) ________________

FAX: (___) ______________________ E-Mail: ___________________________

Membership Directory:
In 255 characters (including spaces) or less please write any description of yourself--
interests, professional activities, etc. If you are already a member, complete only if you wish to
change your description in the Directory.

____________________________________________________________________
____________________________________________________________________
____________________________________________________________________
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____________________________________________________________________

Make annual dues check of $50.00 in U. S. funds payable to the Standard Celeration Society.
Mail application and dues to:

D. C. Hendrickson, Membership Co-Chair  
Association for Precision Teaching  
454 Walnut Street Suite 3  
Newton, MA 02160
TRADITION: FADED DREAMS

The professor slowly walks into the classroom, positions himself behind his lectern, and from his 1944 alligator briefcase, pulls gently out his faded ream of notes. He smiles not, nor does he acknowledge an individual student as he begins his monotone regurgitation from a class he took in 1932. The students sit stiffly and nod off here and there as the ancient lecture begins to unravel. The professor speaks in muffled whispers; almost cadaver-like, he sways and holds on to the lectern for dear life. He had taught this course, his course, for the same way for the last 40 years. Routine...yes, but it was his routine;it was the students' routine to write down the words that would bring enlightenment, enlightenment that never came through this ritualistic attempt to teach. For two hours the students would experience the decayed tradition which was not teaching and certainly was not learning in progress. At the end of the misery session, the professor, bleary-eyed and tired from years of death-in-life, doing time in a university prison, looks out into the class and faintly whispers, "Your exam will be next class meeting. There will be no opportunity for a retake. Study the 12 chapters and the class notes. Be prepared for a comprehensive examination of what you have garnered from my instruction."

The day of the exam passes. Sitting behind his Victorian desk, the professor marks the papers before him. He, without emotion, strikes points off here and there and marks in his weathered gradebook the following rewards of instruction: 12 - "F"; 9 - "D"; 7 - "C"; 1 - "B"; 0 - "A". He meekly closes his grade-book, sighs, and struggles quietly to bed. Another successful day...another lecture for tomorrow.

PRECISION TEACHING: SAILS AWAY

The Precision Learning guide be-bops into the open learning-room. Whistling "Everything's Comin' Up Roses"... he, with trusty stop-watch in hand, readies his kids for the learnin' jam for the day. The students, alert and excited, gaze upon the guide before them and chatter among themselves, pencils in hand and ready to go, go, go! "Ready guys...let's go!" The students collectively hum and buzz in the flurry of learning taking place. The PT hive is alive today with sweet looks of delight and wonder. The minute
passes, and the guide beams as the kids record their tool skill celebrations on the Chart, their report card of learning. Alive with blood-pumping enthusiasm, ready to take on anything, the kids and the guide saddle up and whiz off into the rodeo of the head, headed for a sunset ride into the land of open learning. There is no lectern; there is no alligator case of faded dreams here. Instruction is going on, learning is going on, and real education is taking place! The feeling of delight and wonder permeates all!

THE LINK: FIELD OF DREAMS

The shape of things to come has come. This is the end of the 20th century, and where do we find ourselves as educators, and in what shape do we find education? It is, as Richard Nixon, that sage of a rascal, said, "Quite frankly, it (education), as we know it in America, is in the most pitiful of shapes possible." How sad it is folks... how sad it is to be in this shape. Oh, there are a few diamonds among the cubic zirconias of education out there. In Alabama, of all places, there is the Center for Individualized Instruction at Jacksonville State University, with Claudia McDade at the fore. At Morningside Academy in Seattle, Washington, Kent Johnson heads into the future. Malcolm X College in Chicago has shown great strides in student learning, true learning under the direction of T. Joe Layng. There is evidence of real education taking place at the Ohio State University, with John Cooper and others of his ilk leading the way. And there are others here and there in Utah, Montana, and Tennessee. But folks, this is just a sprinkle of true learning in a collective sense taking place. The country as a whole is suffering... no, our kids are suffering! Why?

For the past 30 years or so, there has been very little going on to assist our kids in true learning. Oh sure, there have been the experimental schools here and yon, there have been the Emersonian and Thoreauesque private nooks of learning scattered about, but otherwise the "same old-same old" has been practiced. Kids aren't learning anything of import in elementary schools and certainly not in high schools. We have become a nation of educator babysitters, and how sad, so very sad that is. Ogden Lindsley, one of the fathers and promoters of real learning, has often said, "the child knows best." And have we listened... have we actually attempted to grasp what those words mean in so far as promoting an educational approach that works? No! We sit on our rumpled laurels and pass kids on to others who pass kids on to others... and those kids have not, and will not, and are allowed not to learn.

So where do we go, and what do we do? Let's begin with accepting reality. The reality in education is that there exists a quagmire from which we must, as learning guides, allow our kids to escape.
Precision Teaching, Direct Instruction and Computer-Assisted Instruction have been proven to be workable learning models of true learning in action. The vicious circle game of "lecture-test" is as out-dated as yesterday's chaperoned dates, phone-booth-stuffing, and disco dancing. In one minute, sixty tiny seconds, a universe of learning can take place in the black hole of current educational practices! SAFMEDS, timed practice sheets, computer learning units, Direct Instruction, rapid fire learning scripts... all are vehicles that will work to get our kids back on the high road of education in America! We may stumble and waffle and sway along the way to a new day in education, but time is on our side. We learn as we teach or guide others to learning how to learn. We applaud learning opportunities, we yell accolades, and we smile in the face of murky tradition!!

We will keep Precision in the classroom. We will keep Direct Instruction in the classroom. We will keep Computer-Assisted Instruction in the classroom! We know, we know, that when kids leave our classes, they all have learned through these approaches! These kids are going to face tradition with Precision! These kids, our kids, will continue to be the teachers for others and themselves when faced with traditional approaches. All we have to do is show them the way, and folks, they, they will take upon themselves the easy chore of continuing to teach themselves how to learn.

And that is how we link Precision to Tradition!

Happy Celebrating!

John Brown is an Instructor in the Center For Individualized Instruction at Jacksonville State University, Jacksonville, AL 36265.

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"Care Enough to Measure Precisely"
Bruce Schroeder received many requests for Ogden Lindsley to repeat his review of landmark, discovery-producing Charts similar to his presentations at the 3rd International Conference in 1983 at Orlando, and at the 9th Conference and twenty-fifth anniversary in 1990 at Boston. (In the interest of historical accuracy, if we counted the 1977, 1978, and 1979 Kalispell, Montana conferences, these would be the 6th and the 12th Precision Teaching Conferences.)

The plan for the 1983 Orlando presentation was to dust off some original landmark transparencies to show many newer Precision Teachers what the Charts looked like that had produced major discoveries. Sharing with them their ancestral Chart roots has always been a priority to keep the largely oral history alive.

The plan for the 1990 Boston twenty-fifth anniversary was to summarize the Chart database more accurately and estimate the induction ratio (i.e., how many Charts were collected divided by how many produced discoveries). I surveyed eighteen 12 inch wide, 9 1/2 inches deep and 10 inches high boxes of transparencies in manila folders to locate landmark, discovery producing Charts. I estimated from sample counts that there were a total of 11,900 transparencies in the boxes. I selected 30 folder topics, including a total of 123 transparencies, as having produced discoveries. This was an induction ratio of 11,900 total transparencies divided by 123 discovery-producing or 97 to 1.

The plan for 1990 in Boston was to also show participants (at the end of the conference when they should be familiar with the Standard Celeration Chart) how standards permit them to rapidly assimilate a huge amount of data at a very high rate. That is why 123 transparencies were presented in 45 minutes—a frequency of about 3 per minute! That proved overwhelming for many participants used to more leisurely Chart perusal. Several criticisms of the high pace were received. Most of the criticisms were from people not familiar with the Chart who had come in merely to hear Ogden Lindsley speak.

The accompanying table lists the number of transparencies in each folder, the 30 discovery folder topics, the year of collection, the discovery result, what part of "MUSIC" it supports, whether it was a disproof or not, the name of the Chart sharer,
and the state in which the Chart was collected for the transparencies presented in 1990 at Boston. To assist Precision Teachers in remembering basic tenants of the technology, as well as in discriminating them from typical educational practice, I coined the acronym, "MUSIC." *

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The 1993 Salt Lake review was a compromise between the 1983 Orlando and 1990 Boston presentations with only 1 or 2 transparencies from each folder presented. However, the pace was still fast, fast, fast! For, without fluency, we are all lost anyway.

* Precision Teaching

Say Multiply instead of Add
Unique               Common
Specific             General
Independent          Correlate
Consequence          Cause

Dr. Ogden R. Lindsley is Founder of Precision Teaching and Professor Emeritus at the University of Kansas, Lawrence, KS.

"Say All Fast Minute Every Day Shuffle"
CHARTS SHARED WITH 9th INTERNATIONAL PRECISION TEACHING CONFERENCE IN KEYNOTE
How to Build Fluency in Reading, Math, and Writing: An Overview

Kent R. Johnson

(Summarized from presenter's handouts by Claudia E. McDade)

For over a decade, Morningside Academy in Seattle, WA has been developing a generative instructional program with remarkable results for both child and adult learners. Generative Instruction focuses upon students' establishing key component skills and their prerequisite tool skills to fluency. Skills developed at Morningside include the basics of mathematics computation and problem solving, reading comprehension, grammar, spelling, writing, and critical thinking. Typical academic gains in the basic skills are two grade levels per month.

The Morningside Model of Generative Instruction represents a model of true mastery, regardless of the skill taught. Teachers must be certain students establish...
accurate associations at the Establishing level. Direct Instruction procedures are utilized at Morningside with emphasis on effective instructional design based on content analysis and programmed sequences. Fluency building and endurance building procedures are a major aspect of the Morningside program—the very areas most of education ignores. Not only must the student be able to apply the skills taught and perform them with persistence, the student must also be able to apply the skills in various contexts.

Regardless of the skill taught, some basic fluency/endurance building procedures that really work include...

- Clearly state each task by channel set, conditions, and movements!
- Set aims that predict remembering, enduring, and application!
- Practice tasks DAILY!
- Practice in a variety of channels and formats!
- The learning team of teacher and student mutually determines a daily aim.
- Mark the place in the instructional materials the student should reach to make a x2 improvement!
- Set a maximum frequency aim for the day; increase the aim by x2/week!
- Encourage a variety of timings—self, peer, teacher!
- In the beginning, heavily coach practice intervals!

Schedule practice intervals of no more than 30 minutes, interspersed with Direct Instruction!

Schedule energetic stretch breaks during practice intervals!

Discourage slow, correct performance!

Encourage simultaneous form and speed improvement!

Don't wait for accuracy to be perfect before increasing fluency (i.e., differentiate responses while building fluency!)

Require mutual student/teacher consultation on phase changes when improvement is less than x2!

Step up when performance is in aim range!

Raise the record floor with sprints for endurance difficulties!

When student pace is erratic, verbally prompt a smoother pace with short breaks and pauses!

Use strong channels for prompting the pace of weaker channels—tapping for reading, remembering by singing, composing by typing!

These fluency building and endurance building procedures should be used to develop students' tool and component skills to very high rates—much higher than they appear to need in daily life. For academic skills to be truly established, however, very high rates are mandatory. The Morningside model will prepare students to integrate their skills into more complex skills at the application level where true mastery is seen.
Using Graphics PracticeSheeter™ to Make Your Own Practice Sheets
Ogden Lindsley, Stephen Graf, Jack Auman

Workshop Description

Participants in this workshop practiced using the software program Graphics PracticeSheeter™ and its training manual. They practiced how to create a set of pictures, edit the pictures, save the pictures on a floppy disk, set up a practice sheet of the pictures, preview the practice sheet, and print the practice sheet.


Each participant received Graphics PracticeSheeter™, its training manual, and a folder (on the floppy disk) containing several previously produced graphics practice sheets.

Stephen Graf's Standard Celeration Chart: Designing The PracticeSheeter

It would have been more appropriate to chart a behavior such as "lines of code programmed" or "number of words typed", rather than just the duration of the behavior. However, I only kept track of my minutes spent working on the Graphics PracticeSheeter. These minutes included programming minutes and minutes spent typing the training manual.

The Weekly Summary Chart shows calendar weeks across the bottom. For each week, I charted the floor of the median daily time spent on Graphics PracticeSheeter. For example, the line representing the fourth week of April shows that median daily amount of time (for that week) was a little more than one hour.

I noticed two trends in the celeration. From April, 1992 through November, 1992 my median daily floor per week decelerated by \(+1.4\) every month with a bounce of \(x4\). This deceleration in the floor meant I was spending more daily time working on the program. From November, 1992 through February, 1993 a celeration of \(x2.1\) with a bounce of \(x2\) was observed. This shows I spent less time daily working on the program. The celeration turned up by a factor of \(x3\) as I neared completion.
Teaching Children to Chart

Michael Maloney

(Summarized from presenter's handouts by Claudia E. McDade)

The outcome of this workshop is the instructional skill to teach students to see/do drop dots at 20-30/min. with 0--2 learning opportunities. Such a skill will involve students in their own learning and share their decision-making with the teacher. Not only will the student achieve greater gains, but the teacher-student team will manage learning more effectively. While reducing teacher "overhead", student charting will also enhance performance accountability.

Teaching children to chart using Direct Instruction procedures is highly effective. Teachers must arrange the classroom in terms of the physical environment, temporal considerations, and actual activities that occur. As in all Direct Instruction scripts, pacing the presentation is critical with the appropriate use of signals, feedback, and corrections. Students must be taught to mastery, followed by fluency building exercises to promote comfort with the Chart.

Children can be taught learning picture rules with the following basic premises:

1. Day lines: lines that go up and down are day lines.
2. Sunday lines: fat lines that go up and down are Sunday lines.
3. Counting lines: lines that go across are counting lines.
4. Record floors: tell how long the measurement lasted.
5. Margin numbers: big numbers in the margin that start with 1, tell you what to count by and what to count from.
6. Chart SAFM Edwards:

   ![Diagram of chart symbols]

   - A dot shows number correct
   - An X shows # of learning opportunities
   - A ? represents a score of 0

Terms for the Standard Celeration Chart can be made into SAFM Edwards:

- Advisor
- Behaver
- Change Day
- Cycle
- Manager
- Phase Change
- Supervisor
- Aim
- Celeration
- Counted
- Day Line
- No Chance Day
- Recorded Day
Students should aim for 20 correct per minute on Chart SAFMEDS.
Lastly, students can be given a daily progress chart of student data. It is important to start training with one pinpoint or behavior per Chart. When they have dropped their dots on the Standard Celeration Chart, they can have their Charts checked by another student in class or by their teacher.

Dr. Michael Maloney founded The Learning Center, a private school combining Direct Instruction with Precision Teaching. He can be contacted at 28 Isabell Street, Belleville, Ontario, Canada K8N5A5.

"Frequency, We Achieve Frequency!"
Integrating Precision Teaching and Direct Instruction

E. Anne Desjardins and Timothy A. Stocum

Precision Teaching and Direct Instruction are a powerful combination in the classroom. Direct Instruction offers a carefully sequenced and formatted instructional process that has repeatedly demonstrated significant academic gains in basic curriculum for children in the elementary grades. While curriculum sequencing and careful instructional formatting are essential, rapid development of competent performance requires a substantial amount of practice. Precision Teaching offers a sophisticated set of measurement practices that allows the teacher to evaluate the student's performance on an instructional sequence and generate productive practice exercises.

Integrating Precision Teaching techniques into Direct Instruction programs ensures mastery by:
1. developing fluency on essential tool skills,
2. creating effective and efficient practice routines, and
3. ensuring that all learning outcomes are at proficient levels.

To develop component or tool skills in reading, spelling, and mathematics, we have used the following pinpoints:

1. Think/Write straight lines (T/W ones)
2. Think/Write slanted lines (T/W slanted lines)
3. Think/Write wavy lines (T/W waves)
4. See letters of the alphabet/Say letter names (Se/S a-5)
5. Think/Write letters of the alphabet (T/W a-z)
6. Think/Say letters of the alphabet (T/S a-z)
7. See/Say numbers 0-9 (Se/S 0-9)
8. Think/Say numbers 0-9 (T/S 0-9)
9. Think/Write numbers 0-9 (T/W 0-9)

In the area of reading, we have addressed the following pinpoints:

1. See words/Say words in a novel story (Se/S story)
2. See words/Say words in familiar story (Se/S story-repeated reading)
3. Think about the story/Say details from the story (T/S details)
4. See a word/Say the definition (Se/S definition)
5. Hear a word in parts/Say the word (H/S word-blending)
6. Hear a word/Say the word in parts (H/S word-segmenting)
7. See letters/Say the names of the letters (Se/S letter names)
8. See letter combinations oa, ea, ou ai/Say the sound (Se/S sounds oa, ea, ou, ai)
9. See word/Say words on cvc, cvce list (Se/S cvc, cvce words)

In the area of spelling, we have addressed the following pinpoints:
1. Hear a word/Say the sounds in the word (H/S sounds in word)
2. Hear a short vowel sound/Write the letter that makes that sound (H/W a-e-i-o-u)
3. See two or more morphographs/Write the combined word (Se/W words)
4. Hear words/Write the word (H/W words)
5. See words in a list/Mark the ones that are spelled incorrectly (Se/M words)

In the area of mathematics, we have addressed the following pinpoints:
1. See a single digit math fact/Write the answer (Se/W math facts)
2. See a clock/Say the time (Se/S time on clock)
3. See a coin/Say denomination (Se/S coin)
4. See a story problem/Say the correct operation (Se/S story problem)
5. See an algorithm in addition, subtraction, multiplication, division or fractions/Write the answer (Se/W algorithm)

The accompanying Charts illustrate some of the ways that Precision Teaching has been used in conjunction with Direct Instruction programs in reading, spelling, and mathematics. These data come from students at the Cache Valley Learning Center in Logan, Utah; Morningside Academy in Seattle, Washington; and the Quinte Learning Center in Belleville, Ontario, Canada.

E. Anne Desjardins is the Director of the Cache Valley Learning Center, 146 North 100 East, Logan, UT 84321. Timothy A. Slocum is affiliated with the Department of Special Education, Utah State University, Logan, UT.
Teaching Addition and Subtraction Word Problems

E. Anne Desjardins

Connecting Math Concepts (Carnine and Engelman, 1992) is a complete basal program, for first through fourth grade, that is designed so all students learn to compute, problem solve and think mathematically. Traditional basal programs fail to teach students to mastery because they err in several ways. First, they use a spiral curriculum where tasks are introduced and after a few lessons, these tasks often disappear from the curriculum. Second, they teach too much too fast. Third, they rely heavily on a discovery learning approach that masks the lack of coherent, effective instruction. Fourth, after students are introduced to a concept, they are expected to work problems on their own. Fifth, because of the spiral curriculum and the attempt to expose students to so many concepts, practice and review are limited. Connecting Math Concepts avoids these mistakes by: 1) using a track curriculum which distributes a concept across many lessons, 2) introducing new material gradually, 3) providing clear and useful explanations, 4) providing guided practice for students as they work problems with a teacher before they work independently, and 5) ensuring that the practice is extensive and review is cumulative throughout the program. It is the application of these 5 principles to teaching word problems that is the focus of this discussion.

The organization of Connecting Math Concepts is such that the component tasks related to solving word problems are tracked throughout the program. They do not appear solely in one set of lessons. At the Cache Valley Learning Center, we have reviewed the Connecting Math Concepts Level 3 program and isolated the word problem tracks, so we could use these instructional sequences for our students who only required instruction in word problems.

Instruction on word problems begins with teaching about number families. Students learn that a number family is made of two small numbers and a big number. Each number family generates four facts (unless the addends are the same as in $2 + 2 = 4$, $5 + 5 = 10$, etc.). Students learn to write a number family given 3 numbers. For example, the number family for 4, 5, and 9 is:

- $4 + 5 = 9$
- $5 + 4 = 9$
- $9 - 4 = 5$
- $9 - 5 = 4$

Students then learn to find a missing number wherever it is in the number family. The basic rule is that if only one number is missing in a family, that number can be
found through either addition or subtraction. The missing number is represented by a box (□). If a student sees □ → 9, s/he would know a small number is missing, and the calculation is subtraction. If s/he sees 4 → □ the student knows the big number is missing, and the calculation is addition.

Once students are firm on identifying the missing number and the appropriate calculation, they learn to substitute letters in place of numbers. This skill enables them to write a number family from reading a word problem sentence. Students learn to translate sentences like the following into a number family.

**Word problem sentence:**
John is 24 inches shorter than Mark.

**Number family:**

\[ 24 \rightarrow J > M \]

From here they progress to adding one more piece of information, so they have a number family with only one missing value.

**Word problem:**
John is 24 inches shorter than Mark. Mark is 65 inches tall.

**Number family:**

\[ 65 \rightarrow 24 \rightarrow J > M \]

Students now can write a subtraction equation to solve for John's height: \[ 65 - 24 = 41 \]. All of the previous steps focused solely on the arrangement of the equation. Students do not proceed to the point where they solve the story problem until they have mastered the steps in setting up the equation.

The program teaches three types of word problems. The above word problem is an example of a comparison problem where one is comparing the height of two people.

All classification problems involve binary sets, two parts that equal the whole. For example: There were 75 cars in the lot. 42 cars were dirty. How many were not dirty?

The number family where D is dirty and N is not dirty:

\[ 75 \rightarrow 42 \rightarrow D \rightarrow N \rightarrow 33 \]

The calculation:
\[ 75 - 42 = 33 \]

33 cars were not dirty.

Temporal sequence problems involve things that happen first, next, and last. The first value named in the problem is the first value written in the number family. The values go forward along the arrow if the problem involves getting more. The values go backward along the arrow if the problem
involves getting less. In the problem below, the values go backward starting with the box (for the sum she started with).

The word problem:
Jane had some stamps. She sold 45 stamps. She ended up with 31 stamps. How many did she start out with?

The number family:
31 45

The calculation:
31 + 45 = 76
She started out with 76 stamps.

The same strategy is used in solving word problems that involve addition and subtraction of fractions. The number family and calculation strategy remain the same whether the problem involves whole numbers or fractions. The following is an example of a comparison word problem.

The word problem:
John ran 5/3 fewer miles than Meg. John ran 14/3 miles. How far did Meg run?

The number family and calculation:
5/3 1/3
14/3
5/3 + 14/3 = 19/3.
Meg ran 19/3 miles.

The number family strategy is also applied to solving table problems. Students treat the rows and columns in the table as number families.

<table>
<thead>
<tr>
<th></th>
<th>Men</th>
<th>Women</th>
<th>Adults</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kate's Cafe</td>
<td>81</td>
<td>209</td>
<td></td>
</tr>
<tr>
<td>Joe's Grill</td>
<td>94</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>213</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

To solve for the number of men that ate at Kate's Cafe the students write the family: 81 ___ > 209. Since a small number is missing, the students know this is a subtraction problem and perform the calculation. To find out how many women ate at both restaurants, the students write the family: 81 94 ___ >. Since a big number is missing, the students add to find the answer. Filling in the missing values is an easy task for the students, since they are skilled at setting up a number family and performing the appropriate calculation given two values and an unknown. The table is nothing more than a series of number families.

Once again Engelmann and Carnine have designed a program that will teach all students. I have been teaching Direct Instruction programs for over a decade, and I never cease to be amazed at their brilliance and caring. However, anyone who is familiar with Direct Instruction knows that students can work through programs and not be successful if the teacher does not teach...
each format until "the students are firm." Without objective measurement about students' fluency, teachers often proceed through the curriculum even though students have not mastered previous tasks. Precision Teaching has much to offer students and teachers in objectifying the decision about whether students are firm. At the Cache Valley Learning Center we are developing Precision Teaching materials that allow students to become fluent on each step in the *Connecting Math Concepts* word problem instructional sequence.

I strongly encourage any teacher to adopt the *Connecting Math Concepts* program in his/her classroom. However, anyone who is working in a tutorial setting or wishes to teach this word problem strategy in conjunction with any current mathematics text, may contact the author at the Cache Valley Learning Center, 146 North 100 East, Logan, Utah, 84321.

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E. Anne Desjardins is the Director of Cache Valley Learning Center, 146 North 100 East, Logan, Utah, 84321.
Building Reading Fluency Across the Curriculum

Gina Freeman and Elizabeth Haughton

The ability to read fluently establishes cultural literacy. It promotes a desire and a sense of urgency to enjoy life-long, independent reading through an understanding of comprehension, contextual vocabulary and a pace which provides sufficient material coverage to promote a keen interest in reading various books, articles and periodicals, not to mention ability to cover curriculum in a comfortable and satisfactory time frame. It is essential that fluency be established first in order to assure its continuation across the curriculum at all levels of advancement.

A major empirical question for Precision Teachers is what tool skill fluency ranges predict fluent composite skill performances. Our experience has taught us that some of the tool skills used to promote reading fluency are:

<table>
<thead>
<tr>
<th>Fluency range</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Think/say reasons for reading</strong></td>
</tr>
<tr>
<td><strong>See/say words from a poem</strong></td>
</tr>
<tr>
<td><strong>Think/say ideas in sequence</strong></td>
</tr>
<tr>
<td><strong>See/say contextual reading</strong></td>
</tr>
<tr>
<td><strong>Think/say A-Z; Z-A</strong></td>
</tr>
<tr>
<td><strong>See/say sounds</strong></td>
</tr>
<tr>
<td><strong>See/say letter names random</strong></td>
</tr>
<tr>
<td><strong>Think/say nouns in the room</strong></td>
</tr>
<tr>
<td><strong>Think/say nouns (generally: home, office, play)</strong></td>
</tr>
<tr>
<td><strong>See/say words (list)</strong></td>
</tr>
<tr>
<td><strong>See/say words (phrase sheet)</strong></td>
</tr>
</tbody>
</table>

Gina Freeman and Elizabeth Haughton are affiliated with the Haughton Learning Center. For further information, contact Elizabeth Haughton, 3166 Jefferson Street, Napa, CA 94558 (707) 224-8863.
Handwriting is the most prevalent output in schools today. Correct pencil holding, student posture, slant and spacing of cursive writing are essential and often instrumental in the attitude of teachers in grading. Handwriting fluency is important for rapid information retrieval, concise note-making and note-taking.

Some of the tool skills necessary for fluent handwriting are:

<table>
<thead>
<tr>
<th>Think/write marks:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>300+/minute</td>
<td>200-150/minute</td>
</tr>
<tr>
<td>300+/minute</td>
<td>200-150/minute</td>
</tr>
<tr>
<td>300+/minute</td>
<td>150-120/minute</td>
</tr>
<tr>
<td>200-150/minute</td>
<td>150-120/minute</td>
</tr>
<tr>
<td>10 circles</td>
<td>300+/minute</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sequential letter formation (lower case):</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Think/write k k k k k - up loop letters</td>
<td>(150-120/minute)</td>
</tr>
<tr>
<td>b) Think/write t r r r r - up straight letters</td>
<td>(150-120/minute)</td>
</tr>
<tr>
<td>c) Think/write e e e e - on line back letters</td>
<td>(150-120/minute)</td>
</tr>
<tr>
<td>d) Think/write f f f f - below the line loop letters</td>
<td>(150-120/minute)</td>
</tr>
<tr>
<td>e) Think/write n n n n - hump letters</td>
<td>(150-120/minute)</td>
</tr>
</tbody>
</table>

Follow with correct upper case: Think/write: 80-60/minute

<table>
<thead>
<tr>
<th>Think/write connected alphabet: 150+/minute</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A B C D E F G H I J K L M N O P Q R S T U V W X Y Z</td>
<td></td>
</tr>
</tbody>
</table>

See/copy words from books and blackboard: 150+/minute

See/think/write 10 word sentences: 150+/minute
If You Can Encourage People to See the Fun in Something, You Can Get Them to Paint the Fence.
Mark Twain's Tom Sawyer

Marion Steiger

Tom Sawyer convinced the kids that painting the fence was fun. Precision Teaching can make learning and behaving fun by putting students in control of their own behavior and their own learning. Students lose their fear of pressure to recall facts, of being tested, and of speed drill, through non-threatening and structured timings. They learn to feel capable of painting the fence.

Research has shown that the greatest need of people is to feel valued, needed, and significant, and to believe that they have some influence or control over their own lives. Precision Teaching can empower kids through structure and consistency in timings, tracking student progress, increasing successful situations, building fluency, and helping students feel secure in quickly generating and expressing their thoughts and answers.

Adolph Moser, in a letter to readers of his book, Don't Feed The Monster On Tuesdays!, said, "I am important to me. I want to feel good about myself, to like myself, and to enjoy being me. I am pleased when I do things well. I like for people to tell me when I've done something right." He went on to say, "I know some people can do some things better than I can. But most of the time, I try to do my very best. When I make improvements, I am pleased."

The approach described in this presentation results in students taking the reins of their own management and learning through identification of personal strengths and weaknesses. They learn to set target goals in a variety of situations and curriculum areas in order to plan for success. Precision Teaching has assisted students at Copperview Elementary School in Midvale, Utah in developing their skills in writing, spelling, math, and self-control. As their skills have improved, so has their self-esteem.

Lily Eskelson, Utah Education President, in October of 1990 said, "...have a plan or vision of where we want to be. The difficult we can do in a day. The impossible takes a little longer if we have a plan."

Marion Steiger is a teacher at Copperview Elementary School, Jordan School District, Midvale, UT 84047.
The Readasaurus Knows - PT Cross-Age Tutoring at Ephraim Elementary

Clarence Brenchley, Marie Beacham, Kathy Peterson, Marie Sorensen, Kay Ericksen and Brett McFarlane

Teachers in Ephraim Elementary School have used Precision Teaching schoolwide with regular students since 1982. One practice we've found particularly effective is to have older students tutor younger students and use Precision timings to monitor progress daily. Fifth graders work with first graders, fourth graders with second graders, and third graders with kindergarten children. Tutors receive training in being effective tutors and in how to monitor and chart Precision timings with their tutee. The tutoring process is completed in about 10-12 minutes. The tutors first practice with their tutees using a variety of techniques and then monitor the timing. They'll usually do a timing in math and reading each day. Teachers monitor student growth closely, based on charts, feedback from tutors, and observing tutees during the timing.

Over the years, we've developed a number of practices and ways of managing the cross-age tutoring that enable us to realize a number of very positive outcomes. Both tutors and tutees make significant academic growth, and programs can be individualized readily. As important, we feel, is the effect the experience of being a tutor has on school climate. Older students are much more considerate of younger children. All children are more able to manage and monitor their own learning plus place more value on learning in general. Learning to help others learn is a valuable life skill that our students gain from the experience also.

The presenters shared information on this cross-age tutoring process including various Precision practices and Charts. The accompanying Chart shared, reflects a fifth grade average reading rate from 1982 through 1991, showing rates on a passage in the fall and one in the spring. From 1985 on, every fifth grade has had an average reading rate of 200 words per minute or greater in the spring...true Precision Learning!

Clarence Brenchley, Marie Beacham, Kathy Peterson, Marie Sorensen, Kay Ericksen and Brett McFarlane are teachers at Ephraim Elementary School, 151 South Main, Ephraim, UT 84627.
The PT is in the Teepee
or
How a Resource Teacher Manages and Teaches
in all Curriculum Areas by Using PT

Christine L. Smith

Teaching students with mild to moderate handicapping conditions in grades K-6 can be mind-boggling at the least. But after attending collegiate classes in which the principles of Precision Teaching were taught, I have become fairly adept in using PT as an effective means of not only monitoring student progress but also in providing choices of strategies for improving learning. PT is used in almost all areas of my daily curriculum. By using PT, I can monitor and motivate student progress. PT can be used to assess individual capabilities and needs. With years of monitoring and determining students' progress and needs in this manner, I, as a resource teacher, can be fairly specific as to isolated procedures and programs for correcting individual deficits and know when to alter (i.e. cut back) those programs.

Identifying students' specific needs in reading, math, and written language is facilitated through the use of PT. Students' specific difficulties in those areas are now easily recognizable to me, and I believe PT has been the driving force behind the insight I have gained into correcting those difficulties. Students are charted daily on their oral reading, sight words, comprehension, phonics and understanding of various math concepts. Simplified charts are used which are later (transferred) to the six cycle Charts. These Charts can easily be used to show parents the pinpointed areas their children are working toward, and they give a visual picture of the students' progress.

The Plains Indians, at one time, most certainly kept track of their buffalo kill by using some type of tally system. My system of tracking students' progress is almost as simple. I am able to adjust my program in all curriculum areas by using simplified procedures that I have developed which follow PT guidelines. My teepee (classroom) is a testament to the use of Precision Teaching principles.

Christine L. Smith is a resource teacher at Bella Vista Elementary School, Salt Lake City, Utah.
ORAL READING
10 MIN. DAILY: M COMPARED TO F.
1st GRADE BOOK (FIELDS & FENCES)

CORRECTS ARE: DAILY READING RATE. ERRORS ARE: UNKNOWN WORDS. COMPARISON: MONDAYS TO FRIDAYS.
Accelerate Your Fluency on PT and Charting Concepts

Elizabeth Haughton, Gina Freeman, and Stephen Graf

Many people exposed to Standard Celeration Charting and Precision Teaching have incorporated strategies into their teaching, but have never actually become fluent with many advanced concepts. This workshop provided an opportunity to become fluent in Precision Teaching and Standard Celeration Charting procedures with a SAFMEDS deck and practice sheets of key concepts, chances to clarify understanding, daily timings with a coach, and an individualized Standard Chart of fluency development.

The accompanying Chart shows the learning picture of Steve Graf, one of the workshop's coaches, as he began this fluency training with SAFMEDS in the spring of 1991. With one timing per day through the whole deck of 132 cards, the frequency of corrects accelerated x1.1 per week, while the frequency of misses decelerated +1.3 per week. The open dot charted in the bottom cycle shows that only one timing per day occurred, with occasional days missed. One could classify this Chart as a "Jaws" learning picture, with correct frequency accelerating and incorrect decelerating. The course of hits had a bounce of x2, while the course of misses had a bounce of x4. Achievement of the fluency aim of 50 hits per minute did not occur under these conditions in the time frame shown.

Director of the Haughton Learning Center, Elizabeth Haughton and her sister, Curriculum Director, Gina Freeman, are both learning specialists. Their Center is located at 3166 Jefferson Street, Napa, CA 94558. They can be reached at (707) 224-8863. Dr. Stephen Graf is a Professor of Psychology at Youngstown State University, Youngstown, OH 44501.

"Chart From The Start"
It's About Time: The Relationship Between Accuracy and Fluency

Claudia E. McDade, John M. Brown and L. Andrew Goggans

As fluency builds, errors decrease in frequency, while corrects increase in frequency. This simple generalization is seen time and again in the Center for Individualized Instruction at Jacksonville State University. For over 15 years, more than 18,000 students have worked in the CII with Precision approaches to develop their academic skills.

Center staff assist students in building their academic skills through the Computer-Based Precision Learning System. Templates within the system shape student performance in any skill or academic discipline. The AccuLearn Template teaches the basic associations between terms and definitions, concepts and principles, or summaries and their evaluations. Once the student answers a particular question, immediate feedback reinforces the accurate answer with an example or corrects the inaccuracy with a bit of text. Exact timing of student progress through the system omits the time students take to review the feedback.

Once students have already formed accurate associations, they proceed to the FluentLearn Template which pushes them to reach high rates of accurate performance. Typically, 10 to 12 questions are drawn from a large item pool, with mastery defined as 12+ correct answers per minute. Students typically finish a single performance session on FluentLearn in less than a minute. Some vocabulary tasks include some words students already associate accurately but do not perform fluently. These are usually presented initially on FluentLearn because students make the appropriate associations very quickly without need for further instruction. Endurance or application exercises are used to verify their use of correct associations.

The EnduroLearn Template is used to develop endurance on the skill or task by asking the student to work through the system in 5, 6, 7, 8, 9, or 10 minute sessions. Students are more likely to see most of the questions in the item pool in EnduroLearn, even though mastery is still defined with fluencies of 12+/minute.

In all three templates, the relationship between fluency and accuracy is confirmed: As fluency increases, accuracy increases to 100% and error decreases to 0%. Typical student performance is seen on the accompanying Standard Celeration Charts.

Demonstration disks of AccuLearn, FluentLearn, and EnduroLearn are available from McLAB, Inc., 206 Burke Avenue NW, Jacksonville, AL 32205.

Dr. Claudia E. McDade is Director of the Center for Individualized Instruction and a Professor of Psychology at Jacksonville State University. John M. Brown and L. Andrew Goggans are Instructors in the Center for Individualized Instruction at Jacksonville State University.
Traditionally, psycho-educational assessment of students suspected of having an educationally handicapping condition, is based on standardized IQ and achievement testing. Standardized IQ and achievement testing have traditionally been used as an attempt to describe and predict student skills and ability. The presenters suggested that a direct measure of student performance in the classroom is a more sensitive and valid assessment procedure. A classroom measure of performance using an existing curriculum has greater criterion validity than standardized tests of achievement.

The audience viewed charted data which had been collected for the purpose of identifying student strengths and deficits within the context of classroom performance in a given curriculum area. Classroom summary charts compared learning disabled students with other students in a world history class and in a second grade class. The Charts are significant because they compare students referred for their learning differences with students they must compete against in their classes.

David Keller, Larry Fildes and Nancy Vad are associated with School District of Flambeau, P. O. Box 86, Tony, WI 54563.
How to Numerically and Graphically Summarize Learning Across Classrooms, Schools and Published Precision Teaching Studies (Metacharting)

Ogden R. Lindsley, Abigail B. Calkin, Owen R. White

This workshop reviewed and practiced summarizing learning pictures across classrooms, schools, and published articles. Its objectives included: review and practice in distributing frequencies and collecting celerations; review and practice in calendar synchronizing and event synchronizing daily, weekly, monthly, and yearly Standard Celeration Chart collections; and introduction of Standard Celeration Metacharting of effects across published Precision Teaching and applied behavior analysis articles.

At an advanced workshop for experienced Precision Teachers and administrators, participants practiced the following:

1. Charting frequencies on daily, weekly, monthly and yearly Standard Celeration Charts.
2. Computing and charting record floors and ceilings.
3. Drawing and projecting accelerations and decelerations (gradual frequency growth and decline) using a celeration focuser.
4. Measuring the size of accelerations and decelerations (gradual frequency growth and decline) by eye and with a celeration finder.
5. Contrasting the abrupt jumps with the gradual turns in celerations.
6. Measuring the size of jumps and turns.
7. Making calendar synchronized and treatment event synchronized celeration collections.
8. Using a scale reader to read numbers from the published graphs.
9. Converting number, percent, duration and latency to standard frequencies.
10. Interpreting and describing metacharts of effects across published studies.

The workshop targeted school principals, curriculum and area coordinators, and district assistant superintendents who need an easy way to summarize the learning under their supervision. It also assisted university-based graduate students, instructors, and assistant professors, who desperately need quality research publications. Most do not yet have graduate students or grant funds. Using merely the methods introduced in this workshop, along with library journals and copy machines, they can make significant contributions to educational research. Since quantified summaries of Precision Teaching research literature have yet to be made,
university personnel were encouraged to use these approaches to construct and publish them.

A list of first publication of the different distributions and collections used in the workshop is provided. Sample celeration collection charts follow.

REFERENCES TO STANDARD CELERATION CHART COLLECTIONS, DISTRIBUTIONS, TALLIES AND TABLES

The following references were the sources of the exemplary Standard Celeration Chart summaries shared in the Pre-conference Workshop entitled, "How to numerically and graphically summarize learning across classrooms, schools and published Precision Teaching studies (Metacharting)." Ogden R. Lindsley, Abigail Calkin, and Owen White conducted the workshop on 24 March 1993 in Salt Lake City, Utah. In most cases the references were the first reported application of each particular summary method.


( Learning Picture Tallies)


(Celeration Change Collections)


(Frequency Dot Distributions)


(Frequency Box Distributions)


(Offset Celeration Pair Collections)

Bounce, Down-Bounce, Verge
Distributions)


Dr. Abigail Calkin is Principal, Quinton Heights Elementary School, Topeka, KS.
Dr. Owen R. White is the Director of the Experimental Education Unit and Professor of Special Education at the University of Washington, Seattle, WA.

"Chart From The Start"

Dr. Ogden R. Lindsley is Founder of Precision Teaching and Professor Emeritus at the University of Kansas, Lawrence, KS.
COUNT PER MINUTE

LAST WK. MHRATES

004 0.016 0.023 0.010 0.018 0.8

MIDACCELERATIONS

x1.0 x1.1 x1.8 x1.1 x1.8 x1.3

BEDLAM 1:1 FREE TIME

COUNTING PERIOD FLOORS

G P a Cn 0 0

CALANDER WEEKS

COUNT PER MINUTE

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140

SUCCESSIVE CALENDAR DAYS

10 LEARNING
DISABLED STUDENTS

PERFECT PAPERS

PER MINUTE

SUPERVISOR
ADVISER
MANAGER

J. S. EDWARDS

J. S. EDWARDS

DEPOSITOR
AGENCY

TIMER
COUNTER

LABEL
CHARTER
The Role of Precision Teaching in a Special Education Department's Adoption of System-Wide Behavior Analytic Methods

Vincent J. Carbone, David E. Gayler and Linda Barbour

The special education department of the Osceola County Schools, Kissimmee, Florida has begun a district-wide initiative towards wholesale adoption of behavior analytic methods of assessment and instruction. Almost all programmatic decisions regarding curriculum, behavior management, assessment, student screening for eligibility, etc. are made by evaluating the alternatives against the standards delineated by the science of human behavior and its research base. Within this context, Precision Teaching methods have made a significant contribution to measuring student and teacher performance. The authors of this program presented Standard Celeration Charted data used for assessment purposes within the pre-referral process, charted data used for instructional decision-making during Direct Instruction lessons and charted data as part of several actual case studies in which a functional analysis of behavior was employed. In addition, the authors presented a computer assisted data-based decision making process used by behavior specialists to guide program development and improvements within classes for students who are Seriously Emotionally Disturbed.

Dr. Vince Carbone is District Behavior Analyst, Osceola District Schools, Kissimmee, FL; David E. Gayler is Director of ESE, Osceola District Schools, Kissimmee, FL; and Linda Barbour is a Resource Compliance Specialist for Osceola District Schools, Kissimmee, FL.

"If Teaching Were Telling, We'd Be So Smart We Couldn't Stand Each Other"
A Simple Management System for Versatile Precision Measures
Shirley C. Montgomery

Students walking into a typical high school classroom come from diverse environments, display variation in disposition, and exhibit uneven levels of innate talents and academic skills. Classroom success or failure depends upon how well these multifarious behavioral and learning characteristics are managed. Teacher accountability and skill, therefore, come from the management of a potpourri of individualized learning strategies, skill monitoring, and honest evaluations. How does the educator provide and monitor individualized tasks that are appropriately challenging for large numbers of students with diverse needs?

The program goal was: to demonstrate how a simplified, versatile, precision process of student goal selection (aim), charting (self-monitoring) and evaluation can be taught and used in a variety of educational environments.

The objectives covered in the program included:

1. Demonstration of a simplified management system of precision goal selection, self-monitoring and evaluation.
2. Demonstration as to how individualization of a fair standard of mastery for each student can be accommodated in a large class for both academic and behavioral objectives.
3. Demonstration of the versatility of the management system by sharing anecdotes and Precision Charts of student goals in co-teaching classes, with ESL foreign students, social skills and cooperative groups, citizenship make-up, and a variety of other academic and behavioral student goals.

A demonstration was given as to how the Goal Selection Forms and Precision Charting are used for individualized student grading and for evaluation of whole class academic objectives. Once learned, the system is used in co-teaching classes; resource classes; with administrative behavioral contracts; in individual citizenship make-up; with students who work by different standards than the class (i.e., ESL foreign students or students with low academic skills); with individual social skills or with group goals in cooperative group assignments.

The success of this simple, versatile, process was demonstrated by sharing teacher anecdotes of the process along with a variety of student Goal Selection Forms and Standard Celeration Charts that were used for a variety of educational and behavioral goals at Olympus High School.

Shirley Montgomery is a resource teacher at Olympus High School, Granite School District, Salt Lake City, Utah 84121.
Five Years of Success: A Symposium
Computer-Assisted Precision Instruction
at Sullivan South High School
Students and Teachers Love It!!

Charles P. Olander, Robert S. Spangler, John Dixon,
Devonda Eiklor, Toni McNutt, Joe Smith, Lynn Hicks,
Terry Taylor, Gayle Bogart and Russell McGaha

A program using computer-assisted Precision Learning techniques is being used at Sullivan South High School in Kingsport, Tennessee. The program began in the 1988-89 school year and is now in its fifth year of operation. Initially the program started with 80 advanced placement students, three classes, three subjects and four computers. Currently the program has 285 students (all levels), fifteen classes, six subjects, nine computers and a full time manager. Overall the results show an improved attitude about Precision Learning, significant academic improvement, and a feeling of accomplishment by all students involved.

In the Computer-Assisted Learning Laboratory (CAPLL), learning is approached from the perspective of the Personalized System of Instruction (PSI). Course material is broken into a given number of units designed by the instructor. Students have the option of repeating a particular unit in an attempt to master the material. To encourage rapid progress and to prevent procrastination, instructors set target dates for given amounts of material to be mastered.

Instructors choose mastery criteria, practice formats, test formats, and feedback conditions for their students. Large test item pools have been developed to allow students to repeat testing without penalty until mastery is obtained. The computer testing program allows instructors to collect and maintain files of student responses and to assess item analyses based on student performance. This advanced technology provides rapid, continuous, on-line data collection for tracking performance of both individuals and groups of students.

CAPLL is available for use by the students from 7:00 a.m. to 3:30 p.m., Monday through Friday. Students are allowed class time for testing once a week. They are also encouraged to schedule testing times before school, during a study hall, during their lunch breaks, or after school. At the end of each drill or test, the student views the results of his/her performance and plots on the daily Celeration Chart. A sample chart is included here. Instructors collect data weekly for analysis.
In addition to reaching high levels of performance, students are expected to experience personal growth as well. As a result of this approach to learning, students learn to take responsibility for their own learning -- rather than blaming a teacher. The students learn "how to learn" and are able to apply this process to other courses.

As a result of the computer-assisted Precision Teaching, students have shown outstanding progress. The data reveal increased frequencies of correct responses and percentage correct not only within, but across, units. Also, this is evidenced by improved classroom discussions and application of these concepts by improved problem-solving skills and essay performance.

Dr. Charles P. Olander is a Professor of Biology at Jacksonville State University, Jacksonville, AL, and Dr. Robert S. Spangler is a Professor at East Tennessee State University, Johnson City, TN. John Dixon is principal of Sullivan South High School, Kingsport, TN, while Devonda Eiklor, Toni McNutt, Joe Smith, Lynn Hicks, Terry Taylor, and Gayle Bogart are teachers at Sullivan South High School. Russell McGaha is Senior System Analyst with Piedmont Educational Computer Consultants, Jacksonville, AL.

### A "Timely Message"

Precision Teaching Logo Watches are now available. The watch is a full color Chart background with Precision Teaching/Celebrate then Celebrate imprinted on the face. It is has a goldtone case, sweep second hand, precise quartz movement, black leather band and two-year warranty. The watch is available in a unisex style for $37.50 each. Please allow 8 to 10 weeks for delivery.

Make check payable to Jacksonville State University Foundation in US dollars. Mail to address below.

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<thead>
<tr>
<th>Name</th>
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<tr>
<td>Street address</td>
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<td>( )</td>
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Journal of Precision Teaching
Center for Individualized Instruction
Jacksonville State University
Jacksonville, AL 36265
Charting Inner Behaviors
Abigail B. Calkin and Jane M. Blackwell

Precision Teaching is well-known as an agent of change in academic skills and inappropriate management behavior. Individuals have also used it as an agent of change for inner behavior such as thoughts, feelings, and urges. In addition to counting inners and using the one minute timing to improve self-esteem, Precision Teaching techniques have been helpful in reducing anxieties, self-destructive inners and their related outer behaviors, and critical self-comments. Participants attending the session did several practice one minute timings. Calkin and Blackwell also examined the use of observing and changing inners, the shift from the concept of cognition to the concepts of inner behavior, and some of the side effects from counting and charting inners.

Abigail B. Calkin, Ph.D., is principal of Quinton Heights Elementary School in Topeka, Kansas and Jane M. Blackwell, Ph.D., is a clinical psychologist in private practice in Salt Lake City, Utah.
Measuring the Effect of Virtual Reality on Human Behavior

Ben F. Eller and Beth Jones

The following points were covered in the presentation:

a. **Define virtual reality** as it relates to human behavior.

b. Address the measurement alternatives for analyzing the effects of virtual reality on human behavior.

c. Discuss the potential of virtual reality as it relates to education and human socialization.

Virtual reality (VR) is no longer just a matter for science fiction. Today VR is an emerging technology. VR is no longer confined to the research lab, but is now being used in numerous diverse commercial fields: scientific visualization, industrial product design, product sales, manufacturing operation simulation, financial modeling, and any other area where people use computers to manipulate, analyze, present, and understand complex data. Real-world applications are being implemented with virtual-world simulation and visualization technologies, via first and second generations VR production hardware and software tools. However, the paradigm shift in perception from reality to using virtual reality hardware and software can be absolutely compelling. The social implications are of great concern. Therefore, the need for defining appropriate measurement tools for this technology is imperative. Alternative measurement procedures, such as the Standard Celeration Chart, may be useful for measuring the effects of VR on performance.

* Using a specially designed mask and glove connected to a computer, running complex software, one becomes an active participant in an artificial 3-D drama simulating interaction between the user and his surroundings.

Dr. Ben F. Eller is a Professor in the College of Education at The University of Alabama, Tuscaloosa, AL 35487, and Dr. Beth Jones is a Professor in the College of Business at Eastern Kentucky University, Richmond, KY 40475.

"PT: SEE/DO!"
Using the Standard Celeration Chart to Measure Student Attitude

David Keller, Stephen Graf and Bruce Schroeder

Dr. O. R. Lindsley first began using the multiply scale in 1976 to measure the attitudes of his university graduate students. It soon became apparent that attitude scaling could become a far more sensitive and differentiating endeavor than had previously been held by a majority of researchers and practitioners. Adequate measurement of human attitude can no longer be accomplished through use of the traditional 5-point Likert scale.

Major advantages can be accredited to the 19-point multiply scale. The additional scale steps provide an opportunity to identify even subtle attitude differences with far greater precision. The 19-point multiply scale dimension expands measurement to parameters which approach the entire range of human attitude. Use of the traditional 5-point scale to measure human attitude is like trying to measure the length of a 20-foot serpent under a microscope; one will never see the big picture.

The 19-point multiply scale has been field tested in a variety of educational settings. These include university course evaluation; workshop evaluation; and evaluation of an alcohol awareness class. Both the evaluation of two alcohol awareness classes and their before/after Standard Celeration Charts are included here.

To facilitate audience learning, the 19-point multiply scale was used as a pre-post assessment of this session. Materials were disseminated to assist participants in the construction of 19-point attitude scale items. Additionally, participants had an opportunity to practice the scaling techniques.

The presenters encourage use of the 19-point multiply scale to measure attitude change in a variety of settings. Use of the 19-point multiply scale is restricted only by the limits of human imagination.

Dr. David Keller is Director of Pupil Services, School District of Flambeau in Tony, WI 54563, while Dr. Stephen Graf is a Professor of Psychology at Youngstown State University, Youngstown, OH 44501, and Bruce Schroeder is Director of the Utah Learning Resource Center, Salt Lake City, UT 84117.

"Up Your Celebration"
<table>
<thead>
<tr>
<th>Multiv Values</th>
<th>MORE</th>
<th>Example: ( x )</th>
<th>Note: In this case, the rater likes chocolate ice cream very much, and does not like vanilla very much at all. So, he says that he likes chocolate ( 200x ) more than vanilla.</th>
</tr>
</thead>
<tbody>
<tr>
<td>( 1/1000 )</td>
<td>( 20 )</td>
<td>( 1 ) ( 1x ) ( 1 ) ( 5 ) ( 5 ) ( 2 ) ( 50 ) ( 500 ) ( 1000 )</td>
<td>( \frac{1}{1000} ) ( \frac{1}{100} ) ( \frac{1}{10} ) ( \frac{1}{2} )</td>
</tr>
</tbody>
</table>

1. Compared to the average person, I know ______ as much about effects of alcohol.
2. Compared to the average person, I know ______ as much about causes of alcohol abuse.
3. Recently provided ideas or information has been ______ as useful in changing my decisions about drinking and driving.
4. 8 gallons is ______ as much as 4 gallons.
5. Compared to a more formal lecture type class, I believe that participation from other group members is ______ as useful.
6. Compared to other classes I have taken, the atmosphere in this class is ______ as comfortable.
7. I like using the multiple scale ______ as much as using the add scale.
8. 1 ton is ______ as heavy as 2 tons.
CALENDAR WEEKS

WEEKS + MIN HRS

ALCOHOL INSERVICE - QUESTION #5- "PARTICIPATION"

SEPTEMBER GROUP BEFORE

OCTOBER GROUP BEFORE

SEPTEMBER GROUP AFTER

OCTOBER GROUP AFTER

CHANGE= 0

CHANGE= 0

CHANGE= *4

CHANGE= *10

P VALUE= .2545

P VALUE= .2216

P VALUE= .1927

P VALUE= .1385

SUCCESSIVE CALENDAR DAYS

SUPERVISOR

ADVISER

MANAGER

DEPOSITOR

AGENCY

TIMER

COUNTER

CHARTER

COUNT IN PER MINUTE

COUNTING PERIOD FLOORS

MIN HRS

SUCCESSIVE CALENDAR DAYS

DEPOSITOR

AGENCY

TIMER

COUNTER

CHARTER
ALCOHOL INSERVICE - QUESTION #7- "LIKE SCALE"

CALENDAR WEEKS

SEPTEMBER GROUP BEFORE AFTER
OCTOBER GROUP BEFORE AFTER
SEPTEMBER GROUP BEFORE AFTER
OCTOBER GROUP BEFORE AFTER

COUNT PER MINUTE

SUCCESSIVE CALENDAR DAYS

SUPERVISOR   ADVISER   MANAGER

DEPOSITOR   AGENCY   TIMER   COUNTER   CHARTER
Use of the Standard Celeration Chart for Audience Attitude Rating of the 10th Annual International Precision Teaching Conference

David Keller and Bruce Schroeder

Assessment of educational conference sessions through the use of some type of rating scale is a common and widespread practice. The 19-point multiply scale, as an attitude measure, is based on Standard Celeration Chart values. Two major advantages can be accredited to the 19-point multiply scale. First, the additional scale steps provide an opportunity to identify even subtle attitude differences with far greater precision. Secondly, the 19-point multiply scale dimension expands measurement to parameters which approach the entire range of human attitude. Use of the traditional 5-point Likert scale to measure attitude is like trying to measure the length of a 20 foot serpent under a microscope; one will never see the big picture.

Use of the 19-point multiply scale to measure attitude is a fairly recent development. Lindsley (1985) reported using the multiply scale as early as 1976, as a graduate course evaluation instrument. The 19-point multiply scale has also been used by Lindsley (1985) as a method for obtaining immediate audience feedback at educational conference workshops and training sessions. The 19-point multiply scale as also been used as a pre/post measure of attitude change among students enrolled in an alcohol awareness class (Keller, 1988).

The presenters shared charted data obtained from audience evaluations of 1992 International Precision Teaching Conference sessions.

David Keller is Director of Pupil Services, School District of Flambeau, in Tony, WI - Bruce Schroeder is Director of the Utah Learning Resource Center, Salt Lake City, UT.

"Frequency Counts"
# Session Evaluation

**Session Title** ___________________________  **Session #** _______  **Date** __________

**Multiply Values**

<table>
<thead>
<tr>
<th>Value</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000x</td>
<td>MOST</td>
</tr>
<tr>
<td>500x</td>
<td></td>
</tr>
<tr>
<td>200x</td>
<td></td>
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<tr>
<td>100x</td>
<td>Example:</td>
</tr>
<tr>
<td>50x</td>
<td>I like chocolate ice cream _____ as much as vanilla.</td>
</tr>
<tr>
<td>20x</td>
<td>Note:</td>
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<tr>
<td>10x</td>
<td>In this case, the rater, having a great fondness for chocolate ice cream, and little interest in vanilla estimated his like for chocolate ice cream to be 200x as much as vanilla.</td>
</tr>
<tr>
<td>5x</td>
<td></td>
</tr>
<tr>
<td>2x</td>
<td></td>
</tr>
<tr>
<td>1x</td>
<td>SAME</td>
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<tr>
<td>1/2</td>
<td></td>
</tr>
<tr>
<td>1/5th</td>
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<td>1/10th</td>
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<td>1/20th</td>
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<td>1/50th</td>
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<td>1/100th</td>
<td></td>
</tr>
<tr>
<td>1/500th</td>
<td>LEAST</td>
</tr>
<tr>
<td>1/1000th</td>
<td></td>
</tr>
</tbody>
</table>

**Directions:** Enter the multiply scale value which best describes your opinion.

**Session Clarity:** Compared to other presentations, the objectives of this presentation were _____ as clear.

**Session Content:** Compared to other presentations, I learned _____ as many facts.

Compared to other presentations, the content of this presentation was _____ as valuable.

**Speaker(s):** Compared to other speakers, this speaker was _____ as knowledgeable.

**Media/Material Effectiveness:** Compared to other presentations, the use of media/materials/handouts for this session was _____ as effective.

**Comments**

What did you like best about this session?

**Suggestions for improving this session:**
Can Computer-Based Precision Learning Increase Test Scores?

Claudia E. McDade, John M. Brown, and Robert Vance

Since 1978, the Center for Individualized Instruction at Jacksonville State University has been developing the Computer-Based Precision Learning System. As the system has evolved with more sophisticated programming, it has maintained certain key elements. The system allows an instructor to ask students questions in multiple formats (i.e., multiple-choice, true-false, matching, concealed multiple-choice, and short answer), regardless of the discipline. Performance results and feedback can be given immediately after each question or after an entire group of questions. Precise timings of frequencies correct and incorrect are based only for the time the question appears until the answer is inputted.

Other Precision Learning techniques are used within the Center in addition to the Computer-Based Precision Learning System. These include SAFMEDS, timed readings, and Precision practice sheets.

The current study compared the performance on a unit on parts of speech of two sections of a developmental writing course.

Subjects
Two classes of Learning Skills 095: Reinforcing Communication Skills were used in the study. Students were automatically placed in LS095 according to their presenting ACT English Subtest Score or chose to take the course as a refresher. There was no significant difference between the classes' ACT English Subtest scores, or mid-term grades in LS 095. The Precision Taught group contained seven students; the traditionally taught group, eight.

Method

Both classes were given a pretest on parts of speech, instruction on parts of speech, and a posttest two weeks after the pretest. A typical item on the assessment instrument was: *Give the part of speech of the word "den" (as in den of lions).* The Precision Taught group participated in timed drills identifying parts of speech out of reading passages or sentences from the board during class sessions. Additionally, Precision Taught students were required to achieve mastery, defined as 10 correct responses per minute, on the Computer-Based Precision Learning System. The traditionally taught group was given standard lectures on parts of speech with no Socratic questioning, precision probes, and little interaction in class.
Results

The Precision Taught group performed better on the posttest than did the traditionally taught group (Mean\(_pT\) = 6.43 with \(s = .53\); Mean\(_{Trad}\) = 2.25 with \(s = 1.22\)). The Mann-Whitney U test \((U = 56 \text{ with } n_1 = 7 \text{ and } n_2 = 8)\) was highly significant at the .01 level. Pretest/posttest scores were plotted on Standard Celeration Charts. Every student in the Precision Taught group increased rate of correct responding and decreased rate of incorrect responding. The student with the lowest entering ACT English Subtest Score (i.e., 3) improved 5x. The learning pictures provided by the Standard Charts are more variable for traditionally taught students.

Anecdotal information from the instructor indicated the Precision Taught class was exuberant and anxious to take the posttest, while the traditionally taught class was "bored silly" and often napped in class.

Discussion

Precision Teaching techniques, including Computer-Based Precision Learning, appear to enhance student learning and performance in underprepared student populations. Interest in learning is more vivid; motivation to learn is higher. Most importantly, rates of performance are higher. Traditional approaches often do not maintain interest or motivation in learning and do not result in student success or satisfaction with performance.

The Center for Individualized Instruction will continue to develop Precision Teaching techniques to assist all students in improving their academic performance.

Dr. Claudia McDade is Director of the Center for Individualized Instruction and a Professor of Psychology at Jacksonville State University, Jacksonville, AL 36265; John Brown is an Instructor in the Center for Individualized Instruction. Robert Vance is an undergraduate student at Jacksonville State University.

"If Teaching Were Telling, We'd Be So Smart, We Couldn't Stand Each Other"
Deceleration
Pre/Post

SUCCESSIVE CALENDAR DAYS

COUNT PER MINUTE

0 10 20 30 40 50 60 70 80 90 100
0 10 20 30 40 50 60 70 80 90 100

DECELERATION: LEARNING OPPORTUNITIES

PRECISION TAUGHT PT/LECTURE PARTS OF SPEECH
SUPERVISOR ADVISER MANAGER 11:00/2:30 BEHAVIOR
DEPOSITOR AGENCY JOHN BROWN COUNTED

JOHN BROWN CHARTER
Standard Glossary and Charting Conventions*

**Acceleration Target** - a movement the behaver, manager, advisor, or supervisor expects to accelerate; the frequency is symbolized by placing a dot on the chart.

**Accuracy Improvement Multiplier** - a measure of change in accuracy over time; celeration correct/celeration incorrect.

**Accuracy Multiplier** - measure of accuracy: frequency correct/frequency incorrect; distance from frequency incorrect to frequency correct; also called the accuracy ratio.

**Accuracy Pair** - two movements, usually correct and incorrect, charted simultaneously.

**Add-Subtract Scale** - any measurement scale on which adding and subtracting by a constant amount is represented by a constant distance; the “up the left” scale on an equal interval chart.

**Advisor** - person who advises a manager, usually viewing Charts on a weekly basis.

**Aim** - an ending goal set for an individual; usually expressed as a specific frequency; symbolized by drawing an “A” at the expected frequency.

**Aim Star** - an ending goal indicating an aim date as well as an aim rate or frequency; symbolized by drawing an “A” at the expected frequency on the aim date.

**Behaver** - person whose behavior is displayed on the Chart.

**Behavior Floor** - the lowest daily frequency possible for a particular behavior; 1/number of minutes behavior can occur; symbolized by drawing a solid horizontal line on the Chart.

**Bounce Around Celeration** - up bounce and down bounce combined; the range of deviations of frequencies from the celeration line.

**Celeration** - basic unit of measurement of behavior change; change in frequency per unit time.

**Celeration Aim** - the expected celeration for a given movement.
Celeration Line - - a best-fit, straight line constructed through frequencies of a given movement on the Standard Celeration Chart.

Celeration Multiplier (turn up or turn down)- - value by which one celeration is multiplied or divided to obtain a second.

Change Day - - first day of a phase change; symbolized by drawing a vertical line covering that day line on the Chart.

Counted - - the behavior being measured.

Counting Period Ceiling - - the highest frequency observable under a given counting procedure; symbolized by drawing a dash line on the Chart connecting the Saturday and Monday lines.

Counting Period Floor - - the lowest frequency detectable by a given counting procedure; 1/number of minutes spent counting; symbolized by drawing a dash line on the Chart connecting the Tuesday and Thursday lines.

Cycle - - distance on the Chart between consecutive powers of 10.


Deceleration Target - - a movement the behaver, manager, advisor, or supervisor expects to decelerate; the frequency is symbolized by placing an “x” on the Chart.

Double Improvement Learning Picture - - both movements of an accuracy pair with celerations in the expected direction; for example

\[
\begin{array}{c}
\cdot \\
\times \\
\times
\end{array}
\]

Down Bounce - - the distance from the celeration line to the frequency farthest below it.

Duration - - the amount of time it takes to complete one occurrence of a behavior; 1/number of minutes spent behaving.

Event-Following Celeration Line - - a celeration line drawn through all frequencies for a given movement just prior to a phase change.

Freehand Method - - a method of visually estimating and drawing celeration lines.

Frequency - - basic unit of behavioral measurement; the number of movements per unit time.

Frequency Line - - a horizontal line on the Chart; also called a counting line.
Frequency Multiplier (jump up or jump down)- value by which one frequency is multiplied or divided to obtain a second.

Geometric Mean - - the appropriate method for obtaining an average on a multiply-divide scale.

Ignored Day - - a day on which the behavior being measured occurs but is not charted.

Latency - - the amount of time between the occurrence of a signal and the beginning of a movement; 1/time from signal to start of movement.

Learning - - a change in performance per unit time.

Learning Picture - - the celeration lines of both movements of an accuracy pair viewed together; for example, ••

Manager - - person who works with the behaver on a daily basis.

Median Celeration - - the middle celeration in a celeration distribution; symbolized by drawing a “<” on the Chart.

Median Frequency - - the middle frequency in a frequency distribution; symbolized by drawing a “<” on the Chart.

Most Recent Celeration Line - - a celeration line drawn through the last 7 - 10 frequencies for a given movement.

Movement - - recorded behavioral event; usually specified in terms of a movement cycle with a beginning, middle and end.

Multiply-Divide Scale - - any measurement scale on which multiplying and dividing by a constant amount represented by a constant distance; the “up the left” scale on the Standard Behavior Chart.

No Chance Day - - a day on which the behavior being measured has no chance to occur.

Overall Celeration Line - - a celeration line drawn through all frequencies for a given movement.

Performance - - the number of movements per unit time; also called frequency.

Periodic Celeration Line - - a celeration line drawn through all frequencies for a given movement in a specific time period, such as bi-weekly or monthly.
Phase Change - - a deliberate alteration made to the behaver's environment in an effort to improve the behavior being measured.

**Quarter-Intersect Method** - - A method used for difficult visual identification of celeration. Draw a vertical line halfway between the time period covered by the data (include ignored and no chance days), divide it into two equal parts and then divide the equal parts into halves. Locate the median frequency for each half and put a dash where the median frequency value and the quarter line intersect for each half period; then draw a line connecting the dashes. This is the celeration line for measuring trend and direction of the frequency dots.

**Recorded Day** - - a day on which the behavior being measured has an opportunity to and is recorded.

SAFMEDS - - card deck with questions on one side and answers on the other. The mnemonic is - Say All, Fast, a Minute, Every Day, Shuffle.

**Single Improvement Learning Picture** - - one movement of an accuracy pair with a celeration in the expected direction; for example,

\[ x \quad x \quad x \quad x \]

**Split-Middle Line** - - a line drawn parallel to a quarter-intersect celeration line, such that half the data points fall on or above the line and half the data points fall on or below the line.

**Standard Celeration Chart** - - a standard, six-cycle semi-logarithmic chart that measures frequency as movements/time and celeration as movements/time/time; Daily, Weekly, Monthly, Yearly and Summary versions are available; also called the Standard Behavior Chart.

**Supervisor** - - a person who views the Charts on a frequent basis.

**Total Bounce** - - distance from the highest to the lowest frequency; analogous to range of an add-subtract scale.

**Trend-Following Celeration Line** - - a celeration line drawn through visible trends for a given movement.

**Up Bounce** - - distance from the celeration line to the frequency farthest above it.


** Additions to the Third Revision
The Center for Individualized Instruction of Jacksonville State University, Jacksonville, Alabama will be offering a Precision Taught, eight week residential program, for students not meeting the required ACT/SAT level for admission to Jacksonville State University, June 13, 1993 through August 2, 1993.

This program is a Precision Learner's dream come true. Students will strengthen basic skills in the areas of writing, reading, quantification, studying, and reasoning through Computer-Based Precision Learning, Direct Instruction, and Precision Teaching. As such, there will be no traditional class groupings--each day, students will begin with their weakest area and rigorously take control of their own learning, striving diligently to excel in academic tool skills and basic competencies for success. ExSEL will be a true celebration! Students will earn 12 credit hours for successful completion of the program.

TO APPLY, STUDENTS MUST SUBMIT THE FOLLOWING:
1. a completed JSU application form with the $20 non-refundable application fee;
2. a completed health information form;
3. ACT or SAT official scores;
4. a high school transcript.

For more information, contact Dr. Claudia E. McDade, Center for Individualized Instruction, Jacksonville State University, Jacksonville, AL 36265 Phone (205) 782-5570
# Standard Celeration Society

## Membership

### Charter Members

<table>
<thead>
<tr>
<th>Name</th>
<th>Organization</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beatrice H. Barrett</td>
<td></td>
<td>236 A Winter Street, Lincoln, MA 01773</td>
</tr>
<tr>
<td>Ray Beck</td>
<td>Sophris West</td>
<td>P.O. Box 1809, Longmont, CO 80502</td>
</tr>
<tr>
<td>Carl Binder</td>
<td>Precision Teaching &amp;</td>
<td>P.O. Box 95009, Nonantum, MA 02195</td>
</tr>
<tr>
<td>John Michael Brown</td>
<td>Jacksonville State University</td>
<td>700 Pelham Road, North, Jacksonville, AL 36265</td>
</tr>
<tr>
<td>Abigail Calkin</td>
<td>Topeka Public Schools</td>
<td>631 Lane, Topeka, KS 66606</td>
</tr>
<tr>
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<td>Jim Cowardin</td>
<td>Precision Learning Systems, Inc.</td>
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<td>Precision Learning Systems, Inc.</td>
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<td>Haughton Learning Center</td>
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<td>Haughton Learning Center</td>
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<td>Hendrickson and Associates</td>
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Ogden, UT  84404

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South Summit School  
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Montezuma Creek, UT  84534

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UMC 65  
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4804 South Dipo Place  
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Anita Cotter  
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P.O. Box 218  
Leander, TX  78641

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Jordan School District  
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Sandy, UT  84094

Ida Crandall  
Garfield School District  
P. O. Box 149  
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Linda Dewyea  
Jordan School District  
8312 South 1275 East  
Sandy, UT  84094

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Jordan School District  
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Draper, UT  84020

Carol Durkee  
Weber School District  
3441 North 1000 East  
North Ogden, UT  84414

Carole Ann Ebright  
Duchesne School District  
Box 1141  
Roosevelt, UT  84066

Carol Esterreicher  
Jordan School District  
8753 South Piper Lane  
Sandy, UT  84093
Judy Farmer
Granite School District
12820 South Fort Street
Draper, UT 84020

Joe Harless
Harless Performance Guild
Box 1903
Newnan, GA 30264

Judith Kissell
Granite School District
2636 East 9600 South
Sandy, UT 84092

Susan Fister
Utah Learning Resource Center
1930 Sheridan Rd.
Salt Lake City, UT 84108

Carol Harrington
Ogden City Schools
Ogden UT 84401

Darlene Kjar
North Sevier Middle School
Aurora, UT 84620

Lynda Flewallen
Alpine School District
841 North 300 West
Pleasant Grove, UT 84062

Diana Hatfield
Cache School District
275 West 1330 North
Logan, UT 84321

Karen Kowalski
North Sanpete School
55 East 100 South
Mt. Pleasant, UT 84647

Joni Forsgren-White
Utah State University
235 East 1200 N.
Logan, UT 84321

Cheryl Hennessey-Wewee
Washington Elementary
420 North 200 West
Salt Lake City, UT 84103

Chris Kupfer
SWEDC
Box 725
Cedar City, UT 84720

Sharon Foster
Nebo School District
185 East 400 North
Spanish Fork, UT 84660

Heidi Hill
Davis School District
184 North 200 West
Kaysville, UT 84037

Denise Larsen
Box Elder School District
1259 W. 4000 N.
Pleasant View, UT 84114

Sheila Fox
2320 Elis Street
Bellingham, WA 98225

Dennis Hogge
Webber School District
5320 South Adams Avenue
Ogden, UT 84405

Logan School District
101 West Center Street
Logan, UT 84321

Kathy Gehrke
Jordan School District
6328 South 370 East
Murray, UT 84107

Donna Hrynshyn
Alpine School District
655 East 950 North
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University of Utah
P.O. Box 3596
Park City, UT 84060

Sue Goodsell
Weber School District
730 West 3950 South
Riverdale, UT 84405

Taya Johnson
Ogden School District
2444 Adams Avenue
Ogden UT 84401

Denise Maseuli
Utah State University
USU Aggie Village #38-1
Logan, UT 84321

Nan Gray
Tooele School District
66 West Vine
Tooele, UT 84074

Joyce Jones
Jordan School District
11515 South 2700 West
South Jordan, UT 84065

Laura Masters Ringard
3922 Alexander Street
Napa, CA 94558

Shirley Greeff-Robison
Jordan School District
1214 West Lafayette Drive
Salt Lake City, UT 84116

Pamela Keele
Jordan School District
545 East 9000 South
Sandy, UT 84070

Bonnie McBride
Box Elder School District
5356 South 575 West
Ogden, UT 84405

Allen Gurney
Nebo School District
350 South Main
Spanish Fork, UT 84660

Karen Kemp
Utah Learning Resource
290 East 4500 South
Salt Lake City, UT 84117

Richard G. McManus
871 Cambridge Street
Cambridge, MA 02141
Mary Memmott
Davis School District
158 West 1700 North
Centerville, UT 84014

Peggy Miller
Jordan School District
8698 Aspen Way
Sandy, UT 84093

Jeanette Misaka
University of Utah
Salt Lake City, UT 84112

Jean Moore
Iron School District
985 S. Three Fountains
Cedar City, UT 84720

Tamra Morgan
Bear River High School
6110 West 1360 North
Garland, UT 84312

Maurine Newton
Weber School District
2465 W. 4500 S.
Roy, UT 84067

JoAnne Nicholson
Ogden School District
1740 E. Kimsbrough Rd.
Sandy, UT 84092

Caren Nielsen
Delta Northe Elementary
176 East 300 North
Delta, UT 84624

Barbara Nielson
Millard School District
160 West Main, P.O. Box
Delta, UT 84624

Sharon Noland
West Jordan Middle School
P.O. Box 70072
West Valley City, UT 84120

Teresa Okada
Granite School District
5655 South 5220 West
Kearns, UT 84118

Elizabeth Oviatt
ULRC, NEA
50 East Maple Drive
Woodland Hills, UT 84653

Craig Pace
Washington High School
3279 Washington Blvd.
Ogden, UT 84401

Jessie Pace
Wayne School District
185 North 200 West, Box
Torrey, UT 84775

James Peterson
Ephraim Elementary
151 South Main
Ephraim, UT 84627

Eleanor Peterson
Salt Lake City School
5632 Park Place East
Salt Lake City, UT 84121

Rhonda Proctor
Nebo School District
40 South 500 West
Payson, UT 84651

Gloria Rasmussen
South Ogden Jr. High
2017 East Jennifer Drive
Ogden, UT 84403

Lori Rawlinson
North Sevier Middle School
P.O. Box 95
Redmond, UT 84652

Gayle Richards
Granite School District
340 East 3545 South
Salt Lake City, UT 84115

Joyce Rollins
Alpine School District
702 West 350 South
Orem, UT 84058

Alisa Roper
Davis School District
1696 North 400 West, #8H
Layton, UT 84041

Jeff Rydalch
Hilda B. Jones Center
382 East 3605 South
Salt Lake City, UT 84115

Karen Sampson
1348 East 900 North
Logan, UT 84321

Myrna Samsel
Box Elder School District
445 West 10th North
Logan, UT 84321

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Gunnison Valley
P.O. Box 27
Gunnison, UT 84634

Ronald Story
Alpine School District
895 North 900 East
American Fork, UT 84003

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Dr. Paul Sullivan
820 Arlington Ave
Petoskey, MI 49770

Gail Taylor
Duchesne School District
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Roosevelt, UT 84066

Nancy Thompson
Granite School District
493 East 10500 South
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Kate Tillinghast
Hillcrest High
7350 South 900 East
Midvale, UT 84047

David Turner
Davis School District
120 West 3000 North
Layton, UT 84041
Kenneth VanAusdal  
Nebo School District  
Box 960  
Santaquin, UT 84655

Tracy Vandeventer  
Crestview Elementary  
1230 South 500 West, #7C  
Bountiful, UT 84010

Paul Wanat  
W 4538 4th Street Road  
Fond Du Lac, WI 54935

Julie Watson  
Granite School District  
160 East Vidas Avenue  
Salt Lake City, UT 84109

Marilyn Wenzel  
Washington School District  
1075 South 950 East  
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Connie Wheeler  
Davis School District  
650 South Main  
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1944 East 5625 South  
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Hazel Willard  
Weber State University  
40 South 300 East  
Kaysville, UT 84037

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South Summit School  
Box 594  
Coalville, UT 84017

Brian Winsor  
Granite School District  
5084 West Verdugo  
Salt Lake City, UT 84118

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1565 East 3150 South  
Salt Lake City, UT 84106

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372 H Street  
Salt Lake City, UT 84103

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Nephi Elementary  
557 N 200 E  
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1375 WEst 500 North, #49  
Provo, UT 84601

Beth Ann Wymore  
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Richard Young  
Utah State University  
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